

# Curricular Support Elements for an Optometry Programme

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# INTRODUCTION

This document will provide schools, colleges and universities intending to start or upgrade an optometry programme with a basis for designing their optometry curriculum. The foundations are what an optometrist needs to be competent in and the level is at highest international standards. Since this document is comprehensive not all programmes will include all elements to the same extent often depending of the regulations governing optometry in the country of the programme. The document does not take into consideration other elements of a general university education. This document considers the elements of the comprehensive eye examination and develops the curriculum content from the knowledge and skills that underpin each element.

The comprehensive eye examination is considered as the sum of the following ten universal elements:

1. Assess the patient's case history
2. Assess the anterior ocular adnexa for their form, condition and functionality
3. Assess the anterior segment for their form, condition and functionality
4. Assess the ocular media for their form, condition and functionality
5. Assess the posterior segment for their form, condition and functionality
6. Assess the quality of the visual pathway and sensory visual function
7. Assess the refractive status
8. Assess the binocular and oculomotor (including near focus) function
9. Assess suitability of spectacles and prescribe
10. Assess contact lens-wear suitability and prescribe

With an element relating to the patient's wellbeing:

11. Assess signs and symptoms of the patient's general health

Together with three (3) additional elements specific to particular categories of patients:

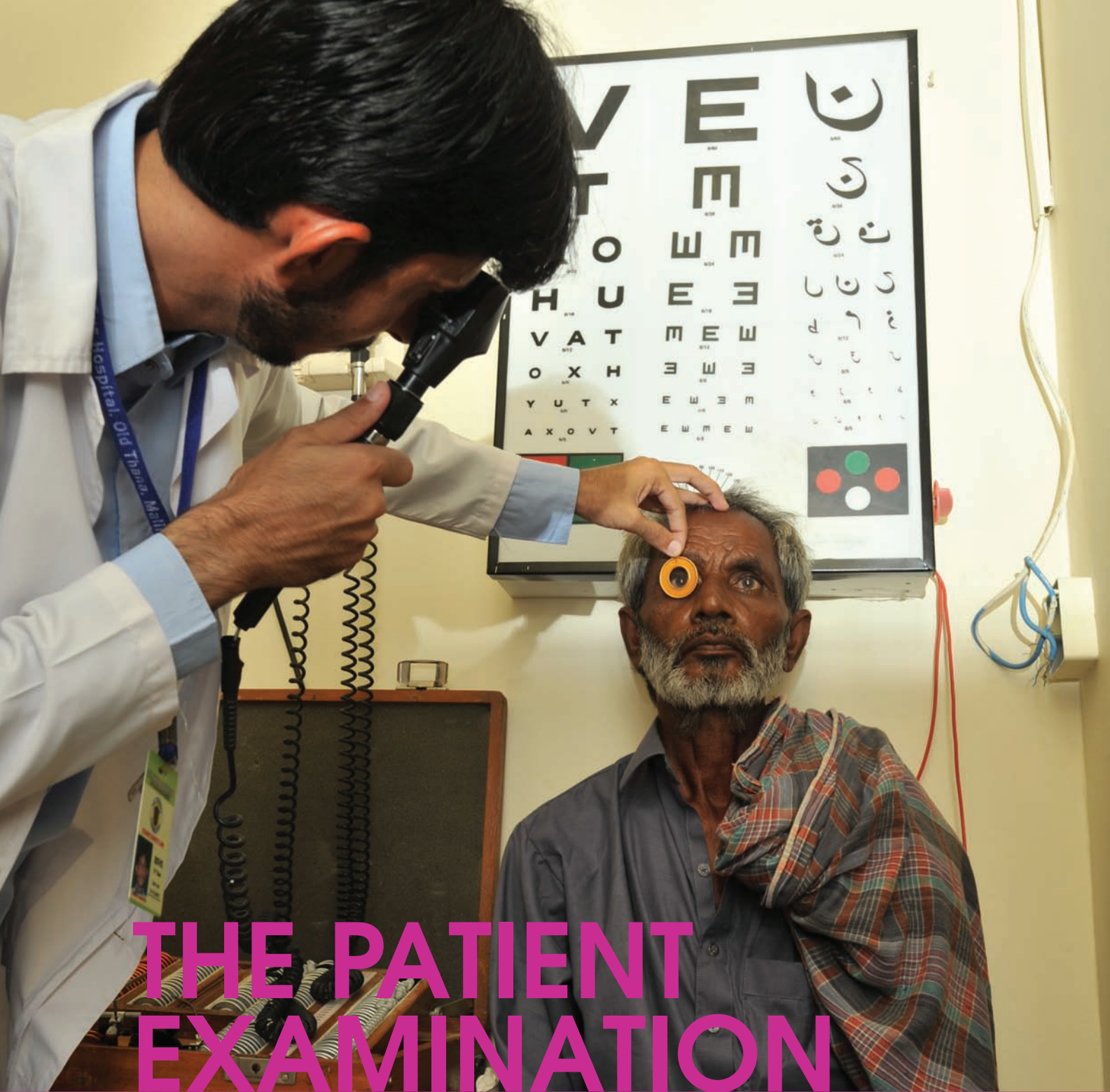
12. Assess and provide care for the paediatric patient
13. Assess and provide care for the low vision patient
14. Assess and provide care for the geriatric patient

And a final important element linked with patient care that is the:

15. Continued professional development of the optometrist and practice based-learning so that modern evidence-based care can be provided

The knowledge and skills required for each of these elements determines the optometry curriculum. The required curriculum topics are listed in the Contents page.





# THE PATIENT EXAMINATION

## Formulate an examination plan

### *Requirement*

- Select procedures that will acquire vital information for diagnosis and management based on the patient history
- Select suitable tests and procedures to the patient's abilities and condition
- Use a problem based (subjective, objective, assessment, plan "SOAP")/ scientific approach to gather data relevant to the patient's problems
- Consider relevant investigations not necessarily associated with the patient's history
- Review and analyze data for consistency
- Formulate one or more diagnoses
- Consider management options and determine appropriate management plans for each of the diagnoses
- Communicate with the patient regarding examination outcome
- Include the patient in management decisions
- Review management outcomes

## Assess the patient's case history

### *Requirement*

- Reasons for visit
  - Chief complaint
  - Other complaints/problems the patient would like addressed
- Ocular history: including
  - Present and past optical appliances
  - Previous eye examination and outcomes
  - Injuries, infections, surgeries
  - Allergies to eyedrops
- Family ocular history
  - Eye conditions in close relatives
  - History of blindness or vision loss in family
- Medical history: including
  - Allergies
  - Infections
  - Medical conditions
    - o Chronic fever, weight loss/gain/fatigue
    - o Ear, nose, throat
  - Medications
    - o Prescribed
    - o Supplements/traditional medicines
  - Review of systems
    - o Cardiovascular
    - o Respiratory
    - o Gastrointestinal
    - o Skin
    - o Musculoskeletal
    - o Urinary
    - o Neurological
    - o Psychiatric
    - o Chronic fever, weight loss/gain/fatigue
    - o Ear, nose, throat
    - o Endocrine
- Use of tobacco products, alcohol, recreational drugs
- Visual tasks
  - Occupational
  - Recreational
  - Specific visual demands
- Goals for the examination

## Enabling Sciences – topics to cover

### *Psychology in Health Care*

- Conceptual approaches to behavioural studies – human behaviour investigations: behavioural; psychoanalytical; humanistic; cognitive and biological paradigms
- Psychological functioning: perception; learning; motivation; emotions; stress and coping; health and illness behaviours
- Communication and interpersonal skills: development of communication and interpersonal skills

### *Anatomy*

- Structure of the human body with respect to regional anatomy
- Functions of the human body with respect to systemic anatomy
- Systemic and regional anatomy integration with respect to medical imaging
- The human body and anatomical terminology
- Skin (integumentary system)
- Skeletal system
- Muscular system
- Nervous system
- Special senses
- Cardiovascular system
- Respiratory system
- Blood, lymphatic and immune system
- Digestive system
- Renal (urinary) system
- Endocrine system
- Reproductive system

### *Cell Biology and Biochemistry*

- Fundamental concepts in biochemistry
- Functional systems within an organism, where cells function as basic building blocks
- Roles of biological molecules in living systems
- Interactions between biochemical pathways in an organism
- Cell structures and function of organelles and the cell as an entity: prokaryotic and eukaryotic cells, architecture of plasma membrane, transport across membrane, internal membranes and cell energetic, chemical signalling between cells, cytoskeleton and cell movement, cilia and flagella, endoplasmic reticulum, ribosome, Golgi apparatus, lysosome and peroxisomes and the nucleus
- Cell cycles and development of cell specificity in eukaryotes, cell cycle and cells in early stage of development, determination and differentiation of cells in higher eukaryotes, and important roles of stem cells
- Introduction to important methods in cell biology: microscopy and histological methods, cell fractionation and analysis of subcellular components, cytochemical techniques, autoradiography and radioisotope labelling techniques
- Structure, properties and functions of molecules of life: water, carbohydrates, lipids, proteins and vitamins, vision biochemistry and its relation to Vitamin A
- Gene information expression: genetic information code; transcription; translation

- Enzymes: nature and mode of action of enzymes, regulation and importance in biological systems, isoenzymes and coenzymes, enzyme kinetics
- Catabolism and generation of energy: bioenergetic principles, glycolysis, citric acid cycle, hexose monophosphate shunt, electronic transport, oxidation of fat, proteolysis, deaminations, fate of carbon skeleton, urea cycle
- Biosynthesis and utilization of energy: gluconeogenesis, glycogenesis, biosynthesis of lipids, amino acids and proteins

### *Physiology*

- Normal functioning of the human body with emphasis on mode of mechanisms
- Integrative nature of the operation of different body systems in health and illness
- Functions of physiological systems in normal body maintenance
- Tissue types and organization: classification of tissues, histological structure and function of tissues; general organization of the human body in relation to organs and systems
- Nervous system: classification, structure, function and properties of neurons and synapses; basic anatomy and divisions of the nervous system; roles of the central and autonomic nervous systems; receptors and chemical transmission at nerve-nerve and nerve-muscle junctions; neurotransmitters; organization and function of the sensory system for both general and special senses; control of body movement
- Endocrine system: definition of hormone, endocrine glands; physiological functions of major types of hormones; general mechanisms of hormone actions for water soluble and insoluble hormones; structure of pituitary gland and hypothalamus and regulations of hormone release
- Cardiovascular system: structure and function of the heart and blood vessels; control of cardiac functions; function of the systemic and pulmonary circulation; haemodynamics; components and properties of blood; structure and function of the lymphatic system
- Respiratory system: organization and structure of the respiratory system; ventilation and lung mechanics; exchange of gases in alveoli and tissues; transport of blood gases; chemical control of ventilation
- Digestive system: structure of the digestive system; digestion and absorption; regulation of digestive processes
- Immune system: classifications of cells of the internal defence system; recognition of self and 'non-self'; non-specific defence processes; specific defence processes; roles of antibodies and complement pathways
- Motor system: main components of the skeleton basic joint anatomy; principles of muscle arrangements, mechanisms of muscle contraction
- Reproductive system: general principles of gametogenesis; male reproductive physiology; female reproductive physiology; female sex cycle; pregnancy
- Renal system: organization of the urinogenital system; structure of a typical nephron; basic renal processes; regulation of sodium and water balance; regulation of potassium, calcium and hydrogen ions



### *Foundation of Disease*

- Principle of diseases: introduction to the study of patterns, causes, mechanisms and effects of diseases; cellular adaptive responses to injury and in disease; tissue responses to microbial infections; immune, infective, environmental and nutritional factors in disease; neoplasia; molecular mechanisms in cell proliferation and necrosis
- Disease topics in local areas: prevalence of disease in the local area, mode of disease pattern, causes, mechanisms, effects and complications
- Acute inflammation and pneumonia; chronic inflammation and tuberculosis; viral infections in human diseases; peptic ulceration and stomach cancer; introduction to neoplasia; lung cancer and nasopharyngeal carcinoma; hepatitis, liver cirrhosis, liver cancer; peripheral vascular diseases; intracranial expanding lesions; Acquired Immune Deficiency Syndrome
- Pathophysiology and basic histopathology of diseases
- Macroscopic, microscopic and diagnostic imaging in disease processes

### *General Pharmacology*

- Introduction to pharmacology and sources of pharmaceutical agents: scope of pharmacology; plants, animals, minerals, micro-organisms, and chemical synthesis as sources of pharmaceuticals
- Pharmacokinetic – routes of administration of pharmaceuticals: enteral, parenteral, topical, transdermal, and sublingual administration; methods and frequency of administration of pharmaceuticals; factors affecting route of administration, and relative merit of one route over others
- Pharmacodynamic – absorption and distribution of pharmaceuticals (factors affecting absorption and distribution of pharmaceuticals): pH-partition theory, physio-chemical properties of drugs; host factors
- Biotransformation of pharmaceuticals: phases of metabolism of pharmaceuticals, factors affecting metabolism of pharmaceuticals, prodrugs
- Elimination of pharmaceuticals: degradation of pharmaceuticals, systems involved in elimination and excretion of pharmaceuticals, routes of elimination, factors affecting elimination of pharmaceuticals
- Modes of action of pharmaceuticals: extracellular, intracellular, receptor and rate theories in the mechanism of action of pharmaceuticals
- Ocular side effects of systemically administered pharmaceutical agents: therapeutic agents that induce ocular side effects, dose dependence and idiopathic ophthalmic adverse reactions to pharmaceuticals, interaction between ophthalmic and systemically administered pharmaceuticals, drug-related ocular emergencies

## Optometry Curriculum – topics to cover

### *Clinical Optometry (with focus on theory)*

- Interpreting background information collected from patients in primary eye care
- Principles and evaluation of ocular health assessment procedures and optometric investigations
- Applying optometric investigations
- Comprehensive patient history taking, devising a working hypothesis and formulating tests to evaluate clinical symptoms
- Procedures for assessments selected
- Case analysis
  - Diagnosis
  - Management
  - Patient training
  - Patient education
  - Follow-up
- Professional responsibility and commitment in primary eye care in the community in diagnosis and treatment
- Integrating and synthesizing clinical findings/information for diagnosis and management plans
- Professional attitude, ethics, and care in performing clinical assessment
- Inter- and intra-professional communication: handling inter- and intra-professional relationships; skill of communicating information amongst professionals; writing referral letters

### *Optometry Clinic (with focus on clinical competency)*

- Case analysis: extracting relevant information and formulating tentative approaches of investigation based on a patient's presented history
- Applying clinical procedures: performing additional clinical procedures as required in the management of patients
- Patient examination: performing full vision examinations on patients in the Optometry Clinic
- Accurate assessment and diagnosis of visual performance and ocular characteristics
- Effective communication with patients and other professionals: presentation of symptoms; critical analysis of clinical findings; proposed plan of action
- Hospital visits
- Ethical and professional clinical optometry practise; understanding of the optometrist's role in the healthcare system
- Diversity of clinical facilities in eye care services
- Effective visual and ocular problems identification in a clinical facility and relevant information collection pertinent to problems
- Provision of vision care and treatment: optical treatments; ophthalmic pharmaceutical agent prescriptions; vision therapy; referrals

### *Case Conference*

- Organizing and analyzing information related to a given case
- Identifying relevant/important and irrelevant/less important elements of a case
- Recognizing different approaches that could be taken and outcomes that may result
- Integrating information from different subject areas and from one's own experience in making appropriate decisions regarding patient care
- Developing appropriate management plans and strategies for coping with unusual cases or clinical entities
- Critiquing patient care decisions made by oneself, or by others
- Communicating important elements of a case to professional colleagues in writing and verbally

# ELEMENT 2

## Assess the anterior ocular adnexa for their structure, health and functional ability

### *Requirement*

- Assess and evaluate with macro-observation, slit lamp biomicroscopy, loupe, palpation, lid eversion, photography, and use of diagnostic pharmaceuticals
  - Conjunctiva
  - Lids
  - Lashes
  - Puncta
  - Meibomian glands
  - Lacrimal glands
  - Skin lesions near the eye

## Enabling Sciences – topics to cover

### *Anatomy*

- As per Anatomy in Element One

### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

### *Physiology*

- As per Physiology in Element One

### *Microbiology*

- Microbiology principles: an aid to diagnosis; specimens required for diagnosis; characteristics of commonly found microorganisms; differences between bacteria, fungi and viruses
- Structures and properties of microorganisms
- Pathogens: sites and sources of infection; properties of microorganisms that cause disease; differentiation of commensals from pathogens
- Parasitism: relationship between host and parasite and between the characteristics of microorganisms and their mode of parasitism
- Spread of microorganism: transmission of disease; infectious disease, epidemic, endemic and carrier; reservoirs of infection and mode of spread; measures to control the spread of infections by controlling transmission, use of quarantine and vaccination
- Eye infections: aetiologic agents of eye infections; the environment, and physical chemical defence mechanisms of the eye
- Chemotherapeutics: principles and use of commonly used antibiotics; mutation and adaption of bacteria to antibiotics
- Care of optical instruments: methods of storage; properties and use of microbiocides
- Sterilization: principles of sterilization and disinfection and the agents commonly used; methods of use of those agents and reasons for their choice; monitoring of the effectiveness of these procedures

### *Foundation of Disease*

- As per Foundation of Disease in Element One

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- Embryology of the eye: sequence of events in the development of the eye and its appendages in the human foetus
- The ocular adnexa: eyelids, lacrimal glands and tear drainage system
- Vasculature in the eye, orbit and adnexa; arterial supply and venous drainage; origins and destinations
- Relationships and functions between structures in the visual system

### *Ocular Physiology*

- Origin and functions of tears, tear film and their importance in relation to ocular health
- Tear physiology: production and drainage of tears; composition; function; pH; secretion rate of tears (Schirmer test and cotton thread test); tear film break up time and glucose concentration in tears
- The eyelids: control of blink actions; functions of eyelid glands and secretory cells

### *Ocular Disease*

- Anterior segment: congenital anomalies of the anterior segment; infection, inflammatory and toxic conditions; degenerative and dystrophic conditions; differential diagnosis of red eye; conjunctival problems, optometric management
- Signs and symptoms of primary and secondary eye diseases involving the anterior segment encountered in clinical practice
- Diseases of eyelids and the lacrimal system: signs and symptoms of inflammation, trauma, tumour and degeneration; differential diagnosis of congenital anomalies; optometric action

### *Clinical Optometry*

- The preliminary examination: goals of performing preliminary tests
- Slit lamp biomicroscopy: methods and practice of illumination and observation; recognize appearances of normal ocular tissues; clinical applications of biomicroscopy; use of vital stains
- Clinical uses of different kinds of diagnostic pharmaceutical agents: clinical applications of ophthalmic diagnostic agents – indications, contraindications and precautions for use; and evaluation of effectiveness of various preparations
- Photo-documentation: methods of ocular photography – anterior eye
- Arterial blood pressure and intra-ocular pressure measurement and interpretation for ocular health evaluation
- Clinical data sampling and analysis for ocular health diagnosis
- Clinical findings/information integration and synthesis for diagnosis and management plans



### Ocular Pharmacology

- Preservatives: preservative commonly used in ophthalmic preparations, physio-chemical and antimicrobial properties, side effects and interactions
- Factors affecting penetration of pharmaceuticals in the eye: physical-chemical properties of pharmaceuticals, drainage system of the eye, vasculature of the eye
- Aspects of ophthalmic pharmaceuticals, forms and methods of administration: dosage forms, principal requirements of ophthalmic preparations, factors affecting efficacy and stability of ophthalmic preparations
- Topical anaesthetics: mechanisms of action, types, biotransformation, and their side effects
- Staining agents: staining properties of fluorescein, lissamine green and rose bengal, and side effects
- Anti-allergic and anti-inflammatory agents and their response cascades: types and classification of pharmaceuticals, modes of action, conditions under which they are to be used, side effects and precautions in use
- Clinical use of vasoconstrictors, antihistamines, mast cell stabilizers, corticosteroid, and non-steroidal anti-inflammatory pharmaceuticals for different ocular problems
- Anti-infective pharmaceuticals for ocular diseases: types and classification of individual groups of pharmaceuticals, modes of action, conditions under which they are to be used, side effects and precautions in use; clinical use of anti-infective pharmaceuticals for different ocular problems
- Epilation, punctal occlusion and irrigation of the lacrimal system
- Treatment of dry eye: lubricants, artificial tears, punctal occlusion and oral supplements
- Systemic side effects of ocular pharmaceutical agents: ocular absorption of topically applied pharmaceuticals, factors contributing to excessive accumulation of pharmaceuticals, types of adverse reactions of pharmaceuticals, precautions, and contra-indications in the use of ocular medications
- Therapeutic treatment for anterior eye disorders: conditions affecting the lids, adnexa, and conjunctiva, and the lacrimal apparatus
- Development of management strategies for different ocular diseases: via case studies and computer assisted learning
- Cardio-Pulmonary Resuscitation (CPR): recognition of signs and symptoms of a heart attack; how to provide CPR until medical help arrives; how to give first aid for choking. Emergency action principles; contacting emergency services; mouth-to-mouth breathing (manikin practise) for adults, children and babies; signs of choking – action in conscious and unconscious adults, children, and infants; recognition of cardiac arrest and action to be taken; recognition of stroke and action to be taken

# ELEMENT 3

## Assess the anterior segment for their structure, health and functional ability

### *Requirement*

- Assess and evaluate with vital dyes and diagnostic pharmaceuticals, slit lamp biomicroscopy, keratometry, keratotomy, topography, gonioscopy, pachymetry, tonometry, photography, exophthalmometry, optical coherence tomography (OCT), ultrasonography
  - Cornea
  - Anterior chamber
  - Aqueous humour
  - Anterior chamber angle
  - Anterior chamber depth
  - Episclera
  - Sclera
  - Iris
  - Pupil
  - Ciliary body

## Enabling Sciences – topics to cover

### *Anatomy*

- As per Anatomy in Element One

### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

### *Physiology*

- As per Physiology in Element One

### *Microbiology*

- As per Microbiology in Element Two

### *Foundation of Disease*

- As per Foundation of Disease in Element One

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- Nerve supply to the eye, orbit and adnexa: motor, sensory and autonomic nerve supply

### *Ocular Physiology*

- The cornea: functions, its different layers and the common conditions that affect the cornea and vision, metabolism and maintenance of transparency
- Mechanism of aqueous humour formation, its function and composition and relate the understandings to intraocular pressure (IOP) and ocular pathophysiology
- The intraocular pressure: its origin, range and distribution in the population; measurement; diurnal variations
- The pupil: factors controlling pupil size; relationship between pupil size and visual function

### *Ocular Disease*

- Signs and symptoms of primary and secondary eye diseases involving the anterior segment encountered in clinical practice
- Diseases of the sclera and uveal tract
- Laboratory tests appropriate for aiding disease diagnosis
- Anterior segment: congenital anomalies of the anterior segment; infection, inflammatory and toxic conditions; degenerative and dystrophic conditions; differential diagnosis of red eye; corneal problems; optometric management
- Ocular injury and trauma – definition: ocular first aid; optometric management
- Conditions requiring immediate referral: recognition and necessary action
- Refractive surgery: different techniques in refractive surgery; pre-operative optometric examination; complications and management of post-refractive surgery

### *Clinical Optometry*

- The evaluation of normal and abnormal pupil responses and iris colour
- Pathological changes in anterior angle
- Intraocular pressures and tonometry: measurement of intraocular pressure; applanation and indentation tonometry; non-contact tonometry; clinical applications of tonometry in practice
- Gonioscopy: principles of methods; types of gonio-lenses, their methods of application; and the appearance of the anterior angle by gonioscopy; abnormal signs in the anterior angle; three-mirror retinal evaluation
- Electrophysiology: principles and applications of visual electrophysiological techniques in optometric practice
- Ultrasonography and other imaging techniques: principles and applications of A-scan, B-scan and ultrasound pachymetry in clinical optometric practice
- Keratometry: clinical application in refraction
- Sphygmomanometry: principle and method of sphygmomanometry; applications in optometric practice; ophthalmodynamometry – theory and application in optometric practice

### *Ocular Pharmacology*

- Therapeutic treatment for anterior eye disorders: conditions affecting the cornea, and the sclera
- Autonomic nervous system, innervation of the eye, neuronal transmitters in the eye and their interactions with receptor subtypes; fate of transmitter substances and their action in the eye: biotransformation of acetylcholine and norepineprine; receptor types and their distribution in ocular tissues
- Miotics: parasympathomimetic, sympatholytic, anti-cholinesterases, and their side effects
- Cycloplegics and mydriatics: anticholinergics cycloplegic agents; direct and indirect acting sympathomimetic and anticholinergic mydriatic agents, and their side effects
- Pharmacological management of pre- and post-refractive surgery patients

### *Visual Science*

- Measurement of ocular components: methodology and techniques of ocular measurements including ultrasonography, keratometry and pachometry; frequency of distribution of ocular component dimensions

# ELEMENT 4

## **Assess the ocular media for their structure, health and functional ability**

### *Requirement*

- Assess and evaluate with direct and indirect ophthalmoscopy, retinoscopy, photography, diagnostic pharmaceuticals, slit lamp biomicroscopy and ultrasound
  - Ocular lens
  - Lens implant
  - Lens capsule

## **Enabling Sciences – topics to cover**

### *Anatomy*

- As per Anatomy in Element One

### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

### *Physiology*

- As per Physiology in Element One

### *Microbiology*

- As per Microbiology in Element Two

### *Foundation of Disease*

- As per Foundation of Disease in Element One

## **Optometry Curriculum – topics to cover**

### *Anatomy for Optometry*

- Structures and media within the eyeball: a detailed study of the different layers of the eyeball, their structures and functions

### *Ocular Physiology*

- The crystalline lens: metabolism and functions in relation to vision, the formation of cataract
- Accommodation: its function, causes and control; the nature and causes of presbyopia in terms of the malfunction of accommodation

### *Ocular Disease*

- Crystalline lens and cataract: differential diagnosis of lenticular anomalies; signs and symptoms of cataract; senile cataract; secondary cataract; complications and management; optometric management



### *Clinical Optometry*

- Retinoscopy: spot and streak retinoscopy – static methods; retinoscopy in astigmatism; near point retinoscopy – Mohindra technique; dynamic methods; variations of dynamic retinoscopy – MEM retinoscopy, chromoretinoscopy
- Direct ophthalmoscopy: basic aspects; appearance of the normal fundus and its variations; an introduction to the ophthalmoscopic signs of ocular disease; clinical practice of ophthalmoscopy
- Indirect ophthalmoscopy: principles of indirect ophthalmoscopy; monocular indirect and binocular indirect ophthalmoscopy – instrumentation and clinical procedures; appearance of the normal fundus; abnormal changes; clinical applications of techniques

### *General and Ocular Pharmacology*

- Ocular side effects of systemically administered pharmaceutical agents: therapeutic agents that induce ocular side effects, dose dependence and idiopathic ophthalmic adverse reactions to pharmaceuticals, interaction between ophthalmic and systemically administered pharmaceuticals, drug-related ocular emergencies
- Clinical use and side effects of corticosteroid pharmaceuticals for different ocular problems
- Miotics: parasympathomimetic, sympatholytic, anti-cholinesterases, and their side effects
- Cycloplegics and mydriatics: anticholinergics cycloplegic agents; direct and indirect acting sympathomimetic and anticholinergic mydriatic agents, and their side effects

### *Visual Science*

- Optics of the eye: optical properties of different ocular structures; different schematic eye models
- Optometers: optics and principles of the simple optometer, Badal's optometer, Young's optometer, retinoscopy
- Accommodation: relationship between stimulus and response; mechanism and properties of accommodation; spectacles and ocular accommodation
- Effects of different radiations to the eye and effects of ocular aberrations on vision
- Importance of light in vision and organisms

### *Optometry Specialties*

- Aphakia and pseudophakos: advantages and disadvantages of aphakic corrections; types of aphakic corrections; problems of the newly corrected aphake; the pseudophakic eye post-operatively; types of pseudophakic correction; complications of pseudophakos

# ELEMENT 5

## Assess the posterior segment for their structure, health and functional ability

### *Requirement*

- Assess and evaluate with direct and indirect ophthalmoscopy, slit lamp biomicroscopy and slit lamp funduscopy, retinoscopy, photography, diagnostic pharmaceuticals, colour vision tests, Amsler test, visual field test, photostress test, pupil reactions, diagnostic imaging and ultrasound
  - Retina
  - Choroid
  - Vitreous
  - Blood vessels
  - Optic disc and neuro-retinal rim
  - Macula and fovea

## Enabling Sciences – topics to cover

### *Anatomy*

- As per Anatomy in Element One

### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

### *Physiology*

- As per Physiology in Element One

### *Microbiology*

- As per Microbiology in Element Two

### *Foundation of Disease*

- As per Foundation of Disease in Element One

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- The orbit: the bones which make up the orbit and the various fossae and canals in the orbit
- The visual pathway: location and anatomical nature of structures comprising the visual pathway; arrangement of nerve fibres from retina to visual cortex; implications of this arrangement on binocularity and visual fields

### *Ocular Physiology*

- The vitreous humour: its production, composition, metabolism, and functions
- The retina: metabolism and functions of the various layers; phototransduction mechanism; and relationship of retinal functions with various vegetative functions of other ocular structures
- Photochemistry of vision: visual pigments; chemical nature of rhodopsin; responses to light

### *Ocular Disease*

- Conditions of the orbit and orbital structures: congenital and developmental anomalies; signs and symptoms of infection and inflammatory conditions; signs and symptoms of orbital trauma and tumours
- Proptosis: conditions affecting the eyes and ocular adnexa
- Clinical aspects of ultrasound, CT (computerized tomography) and MRI (magnetic resonance imaging): investigative techniques, clinical application for diagnosis of ocular disease
- Glaucoma: definition and incidence; review of aqueous physiology and angle anatomy; signs and symptoms, investigative techniques; secondary glaucoma; criteria for referral
- Diseases of the vitreous and retina: vascular anomalies; inflammatory conditions; retinal detachment; degeneration and dystrophies; laser and cryotherapy treatment; congenital and developmental conditions; trauma and foreign bodies; optometric involvement
- Macula: congenital and inherited conditions; degeneration and dystrophies; toxic conditions; treatment
- Ocular signs of systemic diseases: signs and symptoms; optometric management
- Neuro-ophthalmology: review of anatomy, physiology, and retinotopic visual field organization; symptoms and investigative techniques of visual field loss: signs and symptoms of optic nerve disease; differential diagnosis of ophthalmoplegia; papillary pathway and tests; congenital and developmental papillary anomalies; differential diagnosis of papillary defects; neural problems involving visual pathway

### *Clinical Optometry*

- Fundus biomicroscopy: contact fundus lens; the Hruby and Volk lenses and their principles and applications in clinical practice; fundus appearance with biomicroscopy
- Visual fields and visual field tests: Bjerrum screen; visual field screeners; principles and practice; perimetry – static and kinetic perimetry; automated perimetry; detection of visual field defects
- Macular functions: various techniques to assess the integrity and functionality of the macula, Amsler grid, photostress test, neutral-density filter test, colour comparison test and brightness comparison test
- Pathological fundus changes
- Colour vision and colour vision tests: clinical assessment of colour vision; applications of colour vision tests; congenital vs. acquired colour vision defects; clinical manifestations of acquired colour vision defects
- Advanced Optometric Investigation – principles and clinical applications of new optometric instruments: Nerve Fibre Analyzer (NFA); Orbscan system; IOL Master and Optical Coherence Tomography (OCT)

### *Ocular Pharmacology*

- Medical treatment of glaucoma: types and classification of individual groups of pharmaceuticals for glaucoma treatment, modes of action, conditions under which they are to be used, side effects and precautions in use

### *Visual Science*

- Anatomy of the visual pathway: nerve fibre distribution in the retina, optic nerve, optic chiasma and optic pathway; visual and synaptic relations in the midbrain and cerebrum
- Light and the visual system: introduction to photometry; light as a physiological stimulus, characteristics of light, representation of visual stimulus on the retina, brightness sensation; circadianism and vision, effect of melatonin on the retina
- Retinal integration of visual information: convergent properties of retinal signals in the retina; integration of visual information in the retina in relation to control of retinal sensitivities, wavelength and spatial/spectral sampling
- Electrophysiology of the visual system: physiological basis of ERG, EOG, and VER to structured and unstructured stimuli; knowledge of multifocal technique in visual electrophysiology
- Neural organization of the visual system in the brain: representation of the visual stimulus on the visual cortex; receptive fields and properties of various cells involved in the visual pathway; relationship between cortical organization and light, form, ocular dominance, spatial localization/orientation; parallelism; functional organization of visual cortex
- Coding in the visual system: concept and organization of receptive fields, edge detection, spatial frequency tuning, neural channels, signal and noise
- Psychophysics of measurement: frequency of seeing, signal detection theory ROC curves, visual threshold, signal and noise, criterion-dependent and criterion-dependent methods in vision research
- Colour vision: spectral sensitivity, wavelength discrimination, colour matching, colour contrast, defective colour perception, classical and recent theories of colour vision, design of colour vision tests
- Visual perception: sensation and perception, theories of perception, perception of space, form and motion, constancies, factors affecting perception

# ELEMENT 6

## Assess the sensory visual function and integrity of the visual pathway

### *Requirement*

- Assess and evaluate contrast sensitivity function, glare, optokinetic nystagmus, pinhole vision, binocular vision
  - Visual acuity
- Assess and evaluate with confrontation, kinetic and static screening and threshold, short wavelength automated perimetry (SWAP) and frequency doubling technology (FDT)
  - Visual fields

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- As per Anatomy for Optometry in Elements Two to Five

### *Ocular Physiology*

- Reflex arcs: the nervous pathway of various ocular reflexes including pupillary, accommodation and convergence; eye movements

### *Ocular Disease*

- Decrease in visual acuity of acute and chronic onsets

### *Clinical Optometry*

- Habitual VA and its significance
- Contrast sensitivity function: theory and clinical use of contrast sensitivity function, contrast sensitivity function curve, commercially available contrast sensitivity charts and systems; clinical significance and interpretations of contrast sensitivity function
- Visual fields and visual field tests: Bjerrum screen; visual field screeners; principles and practice; perimetry – static and kinetic perimetry; automated perimetry; detection of visual field defects

### *Visual Science*

- Visual acuity: limitations for visual resolution; introduction of visual acuity measurement; design of visual acuity chart; factors affecting visual acuity
- Spatial vision: spatial resolution, spatial contrast sensitivity, hyperacuties
- Temporal vision: temporal resolution and flicker, de Lange curve, spatio-temporal characteristics of vision
- Assessment of visual acuity: concepts of aided and unaided acuity; comparisons between systems of recording visual acuity; clinical methods of measurement; relationships between refractive error and acuity, high contrast versus low contrast visual acuity
- Effect of amblyopia and abnormal eye conditions on vision
- Ocular transmission and aberrations: transmission and absorption spectra of the media components; their effects on vision; aberrations of lens systems as applied to the eye; effects of these upon vision
- Entoptic phenomena: physiological visual sensations and their cause and effects



## Assess the refractive status

### Requirement

- Assess and evaluate
  - Spherical ametropia
  - Astigmatism
  - Presbyopia

## Enabling Sciences – topics to cover

### Mathematics

- Applying mathematical reasoning for analysis of different problems
- Extending knowledge of mathematical techniques and adapting known solutions to different situations arising in optics
- Developing and extrapolating mathematical concepts in synthesizing and solving Optics problems
- Resolving mathematical problem in optometry related topics
- Basic mathematics: trigonometry, complex numbers, simple matrices
- Differential calculus: differentiation from the first principles, rates of change, differentiation of algebraic, trigonometric, logarithmic and exponential functions, differentiation of inverse functions and implicit functions, Leibniz's theorem, geometric and physical applications
- Integral calculus: definite and indefinite integrals, techniques of integration, reduction formulas, applications of integrations

## Optometry Curriculum – topics to cover

### Anatomy for Optometry

- As per Anatomy for Optometry in Elements Two to Five

### Ocular Physiology

- As per Ocular Physiology in Elements Two to Six

### Ocular Disease

- Decrease in visual acuity of acute and chronic onsets

### Clinical Optometry

- Ocular transmission and aberrations: transmission and absorption spectra of the media components; their effects on vision; aberrations of lens systems as applied to the eye; effects of these upon vision
- Auxiliary refractive techniques: principles, methods and applications of autorefractometry, photorefractometry and laser refraction
- Subjective refraction: monocular subjective refraction; principles and methods – fogging techniques, fan and block techniques, Jackson's crossed cylinder; monocular refractive endpoints – +1.00D blur, duochrome tests; binocular equalization methods – infinity balance, prismatic techniques; binocular subjective refraction; near subjective refraction

- Refractive error types and subnormal visual acuity case identification
- Optical management of ametropia
- Appropriate prescription correction per refractive and non-refractive conditions and management plan
- Accommodation and presbyopia: comfortable near vision; amplitude of accommodation – methods of measurement, effects of age; crossed-cylinder tests of accommodation; relative ranges of accommodation; accommodative facility test; determination of the presbyopic addition

### *Optics*

- Physical and geometrical optics
- Identifying and resolving optical problems
- Optical instrumentation: stops, pupils and windows; cameras, simple magnifiers and eyepieces, microscopes, and telescopes
- Optics of thick lenses and lens systems: Gaussian optics – reflection and refraction at plane and spherical surfaces; cardinal points of thick lenses and lens systems; image forming systems; matrix method
- Production and measurement of light: dual nature of light; black body radiation; luminous intensity; illuminance; luminance; Lambert's law of emission; fundamental laws of photometry; reflectance, transmittance and absorbance; examples of photometers; principles and applications of lasers
- Lens aberrations: dispersive power of optical materials; achromatic prisms and lenses; monochromatic aberrations; ray tracing
- Wave nature of light: Fresnel's law of reflection; interferometry and applications; optical coating; Fresnel and Fraunhofer diffraction; zone plates and their application; resolving power; polarization by reflection; scattering, dichroism and birefringent; polarizers, applications of polarized light

### *Ophthalmic Optics and Dispensing*

- Ophthalmic lens power and form presentation: lens power and form transposition; writing of prescriptions and lens shapes presentations

### *General and Ocular Pharmacology*

- As per General and Ocular Pharmacology in Elements One to Three

### *Visual Science*

- Emmetropia and ametropia: definition of different refractive conditions; frequency of distribution of ametropia
- Retinal image size and magnification: effects of refractive errors on retinal image size; spectacle and contact lens correction on retinal image size

# ELEMENT 8

## Assess the oculomotor and binocular function

### *Requirement*

- Assess and evaluate with prisms, cover test, head tilt test; ocular alignment and binocular function; placement and adaptability of accommodation; visual information processing
  - Manifest deviation
  - Latent deviation
  - Fixation
  - Versions
  - Vergences
  - Ocular pursuits
  - Saccades
  - Ocular motility
  - Suppression
  - Diplopia
  - Stereopsis
  - Normal and anomalous correspondence
  - Accommodation

## Enabling Sciences – topics to cover

### *Mathematics*

- As per Mathematics in Element Seven

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- The extraocular muscles: anatomy, functions, nervous and vascular supply

### *Ocular Physiology*

- As per Ocular Physiology in Elements Two to Six

### *Ocular Disease*

- Decrease in visual acuity of acute and chronic onsets

### *Clinical Optometry*

- Entoptic phenomena: physiological visual sensations and their cause and effects
- Investigation of binocularity: theories and principles of binocular visual functions; heterophoria and heterophoric tests – principles and methods; accommodation-convergence relationship – AC/A ratios; assessment of fusional vergences – methods and normal findings, vergence-facility test; stereopsis – measurement and clinical applications; identification of binocular anomalies – nomenclature, analysis of binocular status
- Hirschberg test and angle kappa test, theory and methods of the unilateral and alternate cover tests; assessment of binocular motility; near point of convergence and other evaluations; near point of accommodation; evaluation of ocular dominance
- Headaches: clinical presentations of headaches; various causes of headaches; management of patients with headaches as the chief complaint

### *Optics*

- As per Optics in Element Seven

### *Visual Science*

- Binocular vision in humans and other animals: anatomical and structural features in different species with binocular vision; levels of binocularity in different species; evolution and environmental adaptation
- Sensory aspects of binocular vision: visual projection; corresponding and disparate retinal points; theoretical and empirical horopters; Panum's area and fusional space; physiological diplopia; fixation disparity
- Fusional responses and near vision complex: fusional movement; heterophoria; accommodation, convergence and pupillary action
- Depth perception and stereopsis: physical factors aiding depth judgment; stereopsis; theoretical models for stereopsis
- Normal eye movements: fixation eye movement; saccades; pursuit; ductions; versions; vergence
- Aniseikonia: effect of unequal retinal image size on binocular vision and space perception
- Binocular interaction: advantages of binocular vision; binocular summation and inhibition; theoretical models
- Development of normal binocular vision: binocular development from infancy to adulthood; sensitive period; effect of visual deprivation

### *Clinical Binocular Vision*

- Vision therapy concepts, procedures, and instrumentation: synotophore, synotroscope, stereoscopes, anaglyphs, physiological diplopia techniques and their applications
- Heterophoria and its management: aetiology and classification; clinical signs and symptomatology; compensation and decompensation; factors affecting compensation; investigation of compensation; fixation disparity; management of heterophoria problems – effect of the refractive correction, visual therapy and prismatic therapy, prognosis
- Accommodation and convergence anomalies: accommodation and convergence excess and insufficiency, investigation and management
- Heterotropia: aetiology and classification; comitance and incomitance
- Sensory adaptations: development of sensory adaptations in strabismus; amblyopia, eccentric fixation, anomalous correspondence, suppression – clinical signs and investigations
- Management of comitant strabismus and sensory adaptations: occlusion therapy, pleoptics, antisuppression training, restoration of normal correspondence; training the motor angle of strabismus; selection of cases for treatment and prognosis; pre and post surgical orthoptics; role of refractive correction and prisms
- Management of incomitant strabismus: development of motor adaptations; clinical signs and investigations; indications for referrals; optometric management
- Nystagmus: latent and manifest nystagmus; forms of nystagmus, clinical investigation and significance, optometric management





# PATIENT MANAGEMENT

# ELEMENT 9

## Assess suitability of spectacles and prescribe

### *Requirement*

- Assess and evaluate
  - Visual requirements: recreational and vocational
  - Magnification requirements
  - Prism requirements
  - Dispensing requirements and limitations
  - Anisometropia
  - Aniseikonia
  - Lens design

## Enabling Sciences – topics to cover

### *Mathematics*

- As per Mathematics in Element Seven

## Optometry Curriculum – topics to cover

### *Clinical Optometry*

- Case history taking and symptomatology: role of case history in the consultation; questioning techniques and question types; what comprises a case history; recording the history; symptomatology
  - an overview of symptoms found with various forms of ocular problems (refractive, binocular, organic)
- Prescription decisions: aetiology of refractive errors and the influence of etiological theories on the refractive prescription and monitoring the refraction; relating the prescription to the occupational and other needs of the patient
- Clinical case management: simulated and real clinical cases to build up problem solving techniques in case management

### *Optics*

- As per Optics in Element Seven

### *Visual Science*

- As per Visual Science in Elements Three to Eight

### *Ophthalmic Optics and Dispensing*

- Vergence method of ray tracing: theory, method and application of tracing paraxial ray through single and complex lens systems
- Basic optical properties of single vision lenses: optical properties of spherical and sphero-cylindrical lenses; principles of focimeter and lens measure
- Ophthalmic lens power and form presentation: lens power and form transposition; writing of prescriptions and lens shapes presentations
- Ophthalmic prisms and lens decentration: specification of ophthalmic prisms and interactions of prisms; theory and calculation of prismatic effects on lens decentration
- Obliquely crossed cylinders: effects and calculation of cylinders crossed at any angle
- Accurate transposition: calculation of exact lens forms for thick lenses, with bi-toric surfaces
- Lens materials and their fabrication: optical and physical properties of common ophthalmic lens materials; selection of lens materials; processes of lens making
- Lenticular and Fresnel lenses: optical principles and ophthalmic uses of lenticular and Fresnel lenses
- Frame material and types: merits of different types of spectacle frame materials; frame types and component parts; effects of frame designs on fitting
- Frame and face measurement: introduction to spectacle frame and face measurement
- Assessing lens image quality
- Bifocals and trifocals: principle and terminology, optical properties and fitting of bifocals and trifocals with maximum visual efficiency and wearing comfort
- Multifocals: principle and terminology, optical properties and fitting of multifocals with maximum visual efficiency and wearing comfort
- Lens thickness considerations and calculation: calculation of thickness in edged lenses
- Lens effectivity: effects of working distance and vertex distance on the prismatic and refractive powers in spectacles
- Spectacle lens design: principles and methods of ophthalmic lens designs; aberration correcting lenses; lens material selection for spectacle prescriptions; safety prescriptions
- Tinted lenses: radiation and the eye; ophthalmic uses of tinted/ photochromatic lenses; Polaroid lenses
- Spectacle fitting: factors to be considered in lens and frame selections; principles and practical aspects of spectacle frame fitting; adjustments; safety and efficiency; optical and fitting suitability evaluation

### *Optometry Clinic*

- Spectacle frame dispensing and adjustment: fitting and delivery of spectacles to patients

## Assess contact lens-wear suitability and prescribe

### *Requirement*

- Assess and evaluate
  - Contact lens visual requirements
  - Fitting parameters
  - Patient compliance
  - Contact lens performance

## Enabling Sciences – topics to cover

### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

### *Physiology*

- As per Physiology in Element One

### *Microbiology*

- As per Microbiology in Element Two

### *Foundation Disease*

- As per Foundation Pathology of Disease in Element One

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- As per Anatomy for Optometry in Elements Two to Five; and Eight

### *Ocular Physiology*

- As per Ocular Physiology in Elements Two to Six

### *Ocular Disease*

- Decrease in visual acuity of acute and chronic onsets
- Managing ocular emergencies
- Corneal and conjunctival problems

### *Clinical Optometry*

- As per Clinical Optometry in Elements Two to Three; and Six to Nine

### *Optics*

- As per Optics in Element Two

### *Ocular Pharmacology*

- Pharmacological management of contact lens related problems



*Visual Science*

- As per Visual Science in Elements Three to Eight

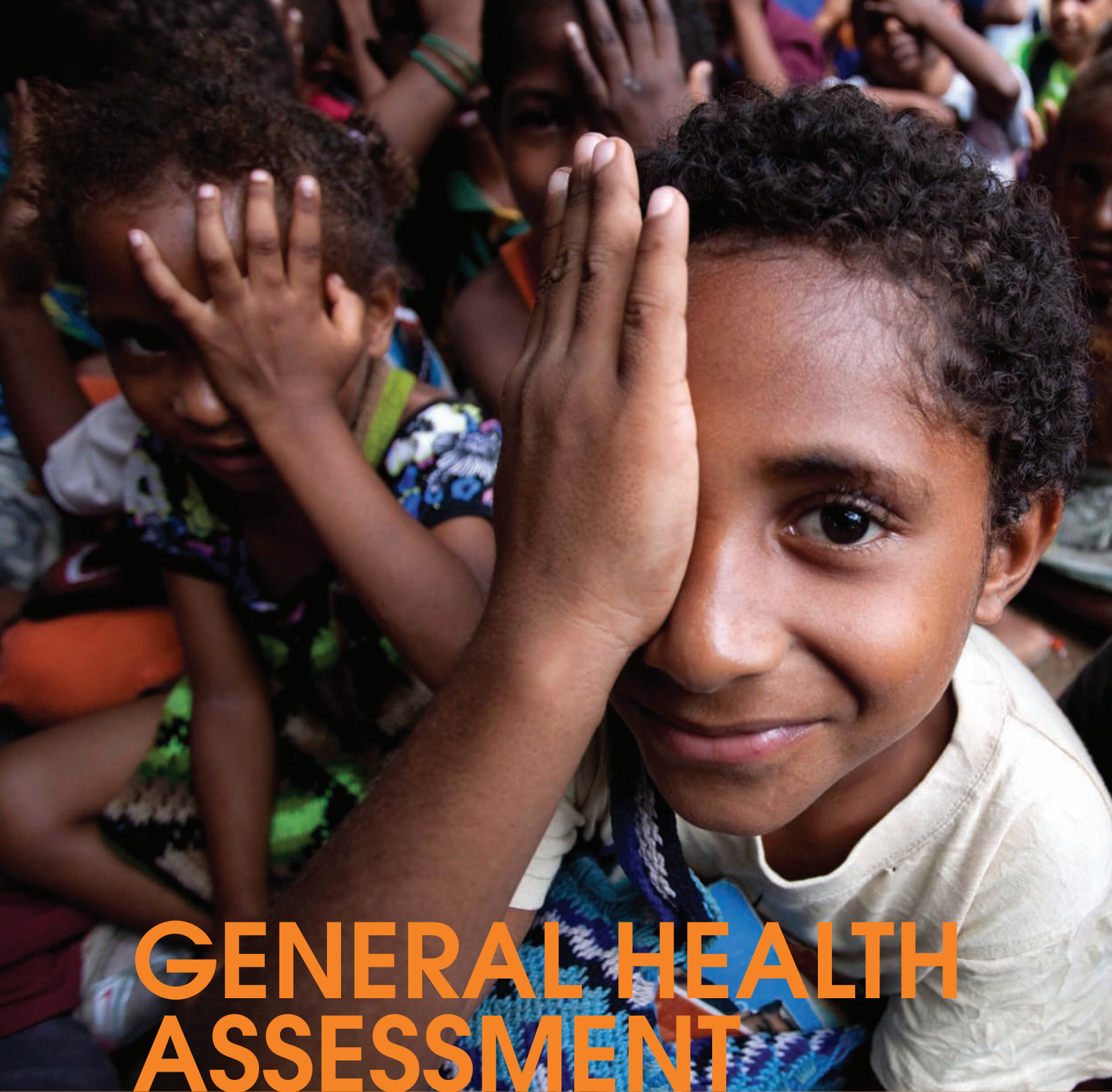
*Contact Lens Practice*

- Corneal shape and measurements: cornea, corneal shape (topography) and the use of keratometer in contact lens practice; sources of error; contact lens terms
- Corneal physiology and lens wear: optical pachometer; introduction to contact lenses, indications and contra-indications for contact lens wear
- Tear film and blinking: effects of normal blinking on lens wear, tear exchange and lens rotation; abnormal blink patterns and their effects; effect of lens wear on the tear film; tear function tests and their significance
- Properties of contact lens materials: rigid contact lens materials; oxygen permeability and transmissibility; wettability; water absorption
- Lens verification: measuring BOZR and other radii, diameters, thickness, back vertex power; measuring water content; examining edges and surfaces
- Astigmatism and contact lenses
- Contact lens consultations: functions procedures; preliminary, fitting, aftercare routines (stress on slit lamp examinations) and delivery visits
- Soft lenses: lens designs; specific indications and contraindications; fitting principles and assessment of fit; effect of altering parameters; optimum fitting
- Solutions and stains: preservatives used in contact lens solutions; solutions necessary for care of all types of contact lenses; use of stains in contact lens practice; sodium fluorescein
- Optics of contact lenses: tear/cornea lens system; residual astigmatism; magnification and accommodation with contact lenses and their implications; toric RGPs
- Gas permeable rigid lenses: objective; specific indications and contraindications; trial sets and initial lens selection; fluorescein pattern; assessment of lens fit; over-refraction; effect of altering parameters; optimum fitting criteria
- Rigid and gas permeable rigid lenses fitting philosophies and designs; fluorescein patterns; common fitting techniques; forces acting on the lens/eye
- Managing contact lens complications: contact lens spoilage and preventative measures; ocular and lens deposits
- Managing contact lens-related ocular complications: signs, symptoms, aetiology, treatment and prognosis; importance of compliance in contact lens wear (usage and care procedures); breaches in usage/ care procedures; ways to maximize compliance
- Extended wear lenses and disposable lenses: patient selection and management; fitting philosophies; soft versus RGP; management
- Cosmetic contact lenses

- Scleral, hybrid and piggy-back lenses
- Contact lenses for prebyopes and keratoconus
- Introduction to orthokeratology: indications and contraindications, limitations, how ortho-K differs from extended wear, myopic control with ortho-K

#### *Contact Lens Clinic*

- Comprehensive contact lens-history taking
- Suitability of patients for contact lens wear
- Assessing anterior eye and measuring ocular parameters required for contact lens fitting/aftercare
- Evaluating and handling different lens types; identification of common contact lens-related issues
- Lens fitting, evaluation and dispensing
- Managing patient and aftercare (routine and problem solving)
- Legal and ethical issues related to contact lens practice



# GENERAL HEALTH ASSESSMENT





## Assess signs and symptoms of the patient's general health

### Requirement

- Perform
  - CPR
- Identify
  - Patient's general welfare
    - o Emotional and social factors
    - o Abuse and assault
- Recognize and understand
  - Signs of malingering
  - Deviations from physical developmental norms
  - Elements of a physical examination
  - Medical reports
  - Medical pathology laboratory reports
    - o Complete blood counts
    - o Erythrocyte sedimentation rates (ESR)
    - o Cholesterol levels
    - o Blood glucose measurements
    - o Thyroid function tests
  - Endocrine diseases and the eye
    - o Diabetes
    - o Grave's disease and endocrine orbitopathy
  - Radiological reports
    - o X-rays
    - o Magnetic resonance imaging (MRIs)
    - o Computed axial tomography (CAT/CT scans)
  - Cardiovascular diseases and the eye
    - o Sphygmomanometry readings and hypertension
    - o Atherosclerosis and carotid auscultation
    - o Aneurysm and stroke
  - Blood diseases and the eye
    - o Anemia
    - o Leukemia
    - o Lymphoma
    - o Human Immunodeficiency Virus (HIV)
  - Neurologic diseases and the eye
    - o Headache
    - o Multiple sclerosis
    - o Brain tumors
    - o Intracranial pressure
    - o Neuromuscular diseases
  - Nutritional disorders
    - o Vitamin deficiencies
  - Rheumatoid disorders, vasculitis and collagenosis
    - o Rheumatoid polyarthritis
    - o Ankylosing spondylitis
    - o Reiter's syndrome
    - o Sjögren's syndrome
    - o Giant cell arteritis

- Tumors
  - o Brain tumors and vision
  - o Ocular metastasis of primary tumors
- Congenital and hereditary conditions
  - o Common genetic disorders
  - o Common congenital disorders
    - Fetal alcohol syndrome
    - Rubella
    - Syphilis
    - Toxoplasmosis

### Enabling Sciences – topics to cover

#### *Anatomy*

- As per Anatomy in Element One

#### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

#### *Physiology*

- As per Physiology in Element One

#### *Microbiology*

- As per Microbiology in Element Two

#### *Foundation Disease*

- As per Foundation of Disease in Element One

#### *Cell Biology and Biochemistry*

- As per Cell Biology and Biochemistry in Element One

#### *Physiology*

- As per Physiology in Element One



**SPECIALIZED CARE**

## Assess and provide care for the paediatric patient

### Requirement

- Understand the development and norms of child development
- Know the visual and refractive development norms
- Understand relation of vision and learning
- Be able to examine the infant and child
- Management of visual problems in the infant and child

## Enabling Sciences – topics to cover

### Anatomy

- As per Anatomy in Element One

### Physiology

- As per Physiology in Element One

### Microbiology

- As per Microbiology in Element Two

### Foundation Disease

- As per Foundation of Disease in Element One

## Optometry Curriculum – topics to cover

### Anatomy for Optometry

- As per Anatomy for Optometry in Elements Two to Five; and Eight

### Ocular Physiology

- As per Ocular Physiology in Elements Two to Six

### Optics

- As per Optics in Element Two

### Ocular Disease

- Diseases of the eyelids and the lacrimal system: signs and symptoms of inflammation, trauma, tumour and degeneration; differential diagnosis of congenital anomalies; optometric action
- Anterior segment: congenital anomalies of the anterior segment; infection, inflammatory and toxic conditions; dystrophic conditions; differential diagnosis of red eye; optometric management
- Crystalline lens and cataract: differential diagnosis of lenticular anomalies; signs of cataract; complications and management; optometric management
- Ocular injury and trauma – definition: ocular first aid; optometric management



- Conditions of the orbit and orbital structures: congenital and developmental anomalies; signs and symptoms of infection and inflammatory conditions; signs and symptoms of orbital trauma and tumours
- Proptosis: conditions affecting the eyes and ocular adnexae
- Diseases of the vitreous and retina: vascular anomalies; inflammatory conditions; dystrophies; laser and cryotherapy treatment; congenital and developmental conditions; trauma and foreign bodies; optometric involvement
- Macula: congenital and inherited conditions; dystrophies; toxic conditions; treatment
- Neuro-ophthalmology: review of anatomy, physiology, and retinotopic visual field organization; congenital papillary anomalies
- Conditions requiring immediate referral: recognition of conditions requiring immediate referral; necessary action

### *Clinical Optometry*

- The preliminary examination: goals of performing preliminary tests
- History taking; Hirschberg test and angle kappa test, theory and methods of the unilateral and alternate cover tests; assessment of binocular motility; near point of convergence and other evaluations; near point of accommodation, the evaluation of ocular dominance.
- Assessment of visual acuity: clinical methods of measurement; relationships between refractive error and acuity; effect of amblyopia and abnormal eye conditions on vision
- Retinoscopy: spot and streak retinoscopy – static methods; retinoscopy in astigmatism; near point retinoscopy – Mohindra technique; dynamic methods; variations of dynamic retinoscopy – MEM retinoscopy, chromoretinoscopy
- Auxiliary refractive techniques: principles, methods and applications of autorefraction, photorefraction and laser refraction
- Investigation of binocularity: theories and principles of binocular visual functions; heterophoria and heterophoric tests – principles and methods; accommodation-convergence relationship – AC/A ratios; assessment of fusional vergences – methods and normal findings, the vergence-facility test; stereopsis – measurement and clinical applications; identification of binocular anomalies – nomenclature, analysis of binocular status
- Clinical uses of diagnostic drugs: cycloplegic refraction
- Direct ophthalmoscopy: basic aspects; appearance of the normal fundus and its variations; ophthalmoscopic signs of ocular disease; clinical practice of ophthalmoscopy
- Indirect ophthalmoscopy: principles of indirect ophthalmoscopy; monocular indirect and binocular indirect ophthalmoscopy – instrumentation and clinical procedures; appearance of the normal fundus; abnormal changes; clinical applications of techniques
- Colour vision and colour vision tests: clinical assessment of colour vision; applications of colour vision tests; congenital vs. acquired colour vision defects; clinical manifestations of acquired colour vision defects

*Optometry Specialties*

- Paediatric optometry: visual and refractive development and norms; clinical examination of children; management of visual problems in children
- Refractive norms and measuring refractive error in infants and young children; norms and measurement of visual acuity and other visual parameters; genetic and environmental factors in myopia; vision and learning problems; management of visual problems in children

## Assess and provide care for the low vision patient

### *Requirement*

- Consideration of
  - Magnification requirements
  - Working distances
  - Associated pathology
  - Lighting requirements
  - Computer software for low vision
  - Closed circuit television
  - Independent living aids
  - Mobility aids
  - Telescopes
- Prescribe low vision devices to meet patient's visual and functional requirements
- Knowledge of organizations providing rehabilitative and low vision services

## Enabling Sciences – topics to cover

### *Microbiology*

- As per Microbiology in Element Two

## Optometry Curriculum – topics to cover

### *Anatomy for Optometry*

- As per Anatomy for Optometry in Elements Two to Five; and Eight

### *Ocular Physiology*

- As per Ocular Physiology in Elements Two to Six

### *Optics*

- As per Optics in Element Two

### *Ocular Disease*

- Anterior segment: anomalies of the anterior segment; infection, inflammatory and toxic conditions; degenerative and dystrophic conditions; differential diagnosis of red eye; optometric management
- Crystalline lens and cataract: differential diagnosis of lenticular anomalies; signs and symptoms of cataract; senile cataract; secondary cataract; complications and management; optometric management
- Ocular injury and trauma – definition: ocular first aid; optometric management
- Conditions of the orbit and orbital structures: developmental anomalies; signs and symptoms of infection and inflammatory conditions; signs and symptoms of orbital trauma and tumours
- Glaucoma: definition and incidence; review of aqueous physiology and angle anatomy; signs and symptoms, investigative techniques; secondary glaucoma; criteria for referral



- Diseases of the vitreous and retina: vascular anomalies; inflammatory conditions; retinal detachment; degeneration and dystrophies; laser and cryotherapy treatment; developmental conditions; trauma and foreign bodies; optometric involvement
- Macula: degeneration and dystrophies; toxic conditions; treatment
- Ocular signs of systemic diseases: signs and symptoms; optometric management
- Neuro-ophthalmology: review of anatomy, physiology, and retinotopic visual field organization; symptoms and investigative techniques of visual field loss; signs and symptoms of optic nerve disease; differential diagnosis of ophthalmoplegia; papillary pathway and tests; papillary anomalies; differential diagnosis of papillary defects; neural problems involving visual pathway

### *Clinical Optometry*

- Case history taking and symptomatology: role of the case history in the consultation; questioning techniques and question types; what comprises a case history; recording the history; symptomatology – an overview of symptoms found with various forms of ocular problems (refractive, binocular, organic)
- Evaluation of normal and abnormal pupil responses and iris colour; investigation of confrontation visual fields and screening for central field
- Assessment of visual acuity: concepts of aided and unaided acuity; comparisons between systems of recording visual acuity; clinical methods of measurement; relationships between refractive error and acuity, high contrast versus low contrast visual acuity
- Retinoscopy: spot and streak retinoscopy – static methods; retinoscopy in astigmatism; near point retinoscopy – the Mohindra technique; dynamic methods
- Keratometry: clinical application in refraction
- Auxiliary refractive techniques: principles, methods and applications of autorefraction, photorefraction and laser refraction
- Subjective refraction: monocular subjective refraction; principles and methods; duochrome tests
- Slit lamp biomicroscopy: methods and practice of illumination and observation; appearances of normal ocular tissues; clinical applications of biomicroscopy; use of vital stains
- Clinical uses of diagnostic drugs: clinical applications of ophthalmic diagnostic drugs – indications, contraindications and precautions for use; evaluation of effectiveness of various preparations
- Intraocular pressures and tonometry: measurement of intraocular pressure; applanation and indentation tonometry; non-contact tonometry; clinical applications of tonometry in practice
- Direct ophthalmoscopy: basic aspects; appearance of the normal fundus and its variations; ophthalmoscopic signs of ocular disease; clinical practice of ophthalmoscopy
- Indirect ophthalmoscopy: principles of indirect ophthalmoscopy; monocular indirect and binocular indirect ophthalmoscopy – instrumentation and clinical procedures; appearance of the normal fundus; abnormal changes; clinical applications of techniques

- Fundus biomicroscopy: contact fundus lens; the Hruby and Volk lenses and their principles and applications in clinical practice; fundus appearance with biomicroscopy
- Gonioscopy: principles of methods; types of goniolenses, their methods of application; appearance of the anterior angle by gonioscopy; abnormal signs in the anterior angle; three-mirror retinal evaluation
- Visual fields and visual field tests: Bjerrum screen; visual field screeners; principles and practice; perimetry – static and kinetic perimetry; automated perimetry; detection of visual field defects
- Macular functions: various techniques to assess the integrity and functionality of the macula, Amsler grid, photostress test, neutral-density filter test, colour comparison test and brightness comparison test
- Contrast sensitivity function: theory and clinical use of contrast sensitivity function, contrast sensitivity function curve, commercially available contrast sensitivity charts and systems; clinical significance and interpretations of contrast sensitivity function
- Photo-documentation: methods of ocular photography – anterior eye and fundus
- Inter- and intra-professional communication: discussion on handling inter- and intra-professional relationships; communicating information amongst professionals; writing referral letters

#### *Optometry Specialties*

- Low vision: visual impairment defined; examination of the low vision patient; optical aspects of low vision aids; prescription techniques of low vision aids; management of low vision patients; recent research
- Visual impairment defined: legal, medical and social definitions; prevalence and incidence; causes of visual impairment
- Examination of the low vision patient: visual acuity assessment; clinical expectations of visual acuity; refraction and the refractive correction; other investigations including visual field and contrast sensitivity
- Magnification and low vision aids: principles of magnification; optical principles of magnifiers and telescopic aids; types of low vision aids available; clinical assessment of low vision aids; training and applications of low vision aids
- Managing low vision patients: multi-disciplinary approach; rehabilitation services; the optometrist in the multi-disciplinary team
- Low vision services: current services; future planning and projection
- Recent research: clinical applications of recent research into low vision causes and management

### Assess and provide care for the geriatric patient

#### Requirement

- Ability to
  - Understand the visual function, physiological and anatomical changes with age
  - Deliver appropriate care that considers disabilities
  - Select appropriate equipment for domiciliary visits

### Enabling Sciences – topics to cover

#### Anatomy

- As per Anatomy in Element One

#### Physiology

- As per Physiology in Element One

#### Microbiology

- As per Microbiology in Element Two

#### Foundation of Disease

- As per Foundation Pathology of Disease in Element One

### Optometry Curriculum – topics to cover

#### Anatomy for Optometry

- As per Anatomy for Optometry in Elements Two to Five; and Eight

#### Ocular Physiology

- As per Ocular Physiology in Elements Two to Six

#### Optics

- As per Optics in Element Two

#### Ocular Disease

- Crystalline lens and cataract: differential diagnosis of lenticular anomalies; signs and symptoms of cataract; senile cataract; secondary cataract; complications and management; optometric management
- Conditions of the orbit and orbital structures: anomalies; signs and symptoms of infection and inflammatory conditions; signs and symptoms of orbital trauma and tumours
- Proptosis: conditions affecting the eyes and ocular adnexae
- Diseases of the vitreous and retina: vascular anomalies; inflammatory conditions; retinal detachment; degenerations; optometric involvement
- Macula: degenerations; toxic conditions; treatment
- Ocular signs of systemic diseases: signs and symptoms; optometric management

*Clinical Optometry*

- Assessment of visual acuity: concepts of aided and unaided acuity; comparisons between systems of recording visual acuity; clinical methods of measurement; relationships between refractive error and acuity, high contrast versus low contrast visual acuity
- Retinoscopy: spot and streak retinoscopy – static methods; retinoscopy in astigmatism; near point retinoscopy – the Mohindra technique; dynamic methods
- Auxiliary refractive techniques: principles, methods and applications of autorefraction, photorefraction and laser refraction
- Subjective refraction: monocular subjective refraction; principles and methods; binocular subjective refraction; near subjective refraction
- Accommodation and presbyopia: comfortable near vision; the amplitude of accommodation – methods of measurement, effects of age; crossed-cylinder tests of accommodation; relative ranges of accommodation; accommodative facility test; determination of the presbyopic addition
- Slit lamp biomicroscopy: methods and practice of illumination and observation; appearances of normal ocular tissues; clinical applications of biomicroscopy; use of vital stains
- Clinical uses of diagnostic drugs: clinical applications of ophthalmic diagnostic drugs – indications, contraindications and precautions for use; evaluation of effectiveness of various preparations
- Intraocular pressures and tonometry: measurement of intraocular pressure; applanation and indentation tonometry; non-contact tonometry; clinical applications of tonometry in practice
- Direct ophthalmoscopy: basic aspects; appearance of normal fundus and its variations; an introduction to the ophthalmoscopic signs of ocular disease; clinical practice of ophthalmoscopy
- Indirect ophthalmoscopy: principles of indirect ophthalmoscopy; monocular indirect and binocular indirect ophthalmoscopy – instrumentation and clinical procedures; appearance of normal fundus; abnormal changes; clinical applications of techniques
- Fundus biomicroscopy: contact fundus lens; the Hruby and Volk lenses and their principles and applications in clinical practice; fundus appearance with biomicroscopy
- Gonioscopy: principles of methods; types of gonio-lenses, methods of application; appearance of anterior angle by gonioscopy; abnormal signs in the anterior angle; three-mirror retinal evaluation
- Visual fields and visual field tests: Bjerrum screen; visual field screeners; principles and practice; perimetry – static and kinetic perimetry; automated perimetry; detection of visual field defects
- Macular functions: various techniques to assess the integrity and functionality of the macula, use of Amsler grid, photostress test, neutral-density filter test, colour comparison test and brightness comparison test
- Contrast sensitivity function: theory and clinical use of contrast sensitivity function, contrast sensitivity function curve, commercially available contrast sensitivity charts and systems; clinical significance and interpretations of contrast sensitivity function

- Case history taking and symptomatology: role of the case history in the consultation; questioning techniques and question types; what comprises a case history; recording the history; symptomatology – an overview of symptoms found with various forms of ocular problems (refractive, binocular, organic)
- Advanced Optometric Investigation: principles and clinical applications of new optometric instruments; such as Nerve Fibre Analyzer (NFA); Orbscan system; IOL Master and Optical Coherence Tomography (OCT)
- Prescription decisions: aetiology of refractive errors and the influence of etiological theories on the refractive prescription and monitoring the refraction; relating the prescription to the occupational and other needs of the patient

#### *Optometry Specialties*

- Geriatric optometry: anatomic and physiological change with age; changes in visual functions with age; examining the aging patient; aphakia and pseudophakos; housebound or bedridden patient
- Anatomic and physiological change with age: changes in ocular structure with particular reference to retina and lens; development of cataract and age-related maculopathy; clinical implications of age related changes
- Changes in visual functions with age: effects upon visual acuity, colour vision, adaptation, contrast sensitivity, visual field; changes in binocularity
- Examining the aging patient: effects of common systemic and ocular disease; aims and goals of examination; amendments to routine to account for change in visual function
- The housebound or bedridden patient: optometric examination; role of the optometrist in institutional care; domiciliary visits





# PROFESSIONAL RESPONSIBILITIES



## Continued professional and practice based-learning and development of the optometrist so that modern, evidence-based care can be provided

### Requirement

- Development of knowledge, clinical expertise and skills
- Ethical practise values
- Professional patient management
- Practice management
- Legal understanding
- Professional role in community

### Enabling Sciences – topics to cover

#### *Applied Statistics and Research Methodology*

- Reference journal papers and literature: locating, critiquing, citing, reviewing and referencing
- Principles involved in conception, design, conduct and completion of research projects
- Research ethics
- Structuring a literature review
- Generating hypotheses
- Experimental designs
- Describing and displaying quantitative and qualitative data
- Choosing and using appropriate statistical tools
- Interpreting and reporting statistical test results
- How science is done; the “Research Method” and alternative views
- Developing skills for project work
- Plagiarism and its avoidance; citing sources
- Ethical issues in research
- Types of data; displaying data; averages and dispersion; identifying and handling outliers
- Introduction to probability; characteristics of normal distribution; sampling distribution of mean and standard error; degree of freedom
- Sample size consideration; null hypothesis; experimental hypothesis; error in hypothesis testing (type I and type II errors)
- Definition of power; one and two-tailed tests; concept of p values
- Parametric and non-parametric tests; student’s T test; Wilcoxon test, Mann-Whitney tests, Krustal Wallis test; Chi-square test
- Principle of independence of data; correlation; research questions; experimental and non-experimental designs; random assignment; matched assignment
- Control groups; placebo effect; masking; prospective vs. retrospective; longitudinal vs. cross-sectional; validity and reliability of data; repeated measures; sensitivity and specificity; false positive and negative
- Populations and random samples; sampling methods; random, systematic and stratified sampling; external validity
- Descriptive research; surveys and questionnaires; interview techniques



### *Project*

- Drawing relevant information from literature with regard to research topics
- Conscientious and rational pursuit of a research topic
- Written and poster presentations: logical and clear interpretation, presentation and discussion of information and results; demonstration of deep understanding

### *Psychology in Health Care*

- Developmental issues across the life span: major stages in human development and particular issues that are encountered within these stages

## **Optometry Curriculum – topics to cover**

### *Practice Management*

- Starting a practice: modes of practice; business plans; business registration; location; practice design; business registration and legal requirements
- Marketing: strategies and plans; consumer behaviour; market segmentation; pricing strategies
- Accounting and taxation: managing finances; budgeting (capital budget, monthly revenue and expense budget); inventory control; setting up an accounting system; banking; cash flow; estimate payback period of equipment; financial risk and control; taxation and taxation planning
- Management systems: patient record management system; inventory control system
- Financial management: financial reporting; management reporting
- Managing staff: motivating staff; continuous development; appraisals
- Estate planning: goals and strategies; investment; MPF

### *Community Optometry*

- Vision-care programme: planning, organizing and conducting a vision-care programme in collaboration with a non-optometric organization
- Role of optometrists in the community: as primary care providers; their role in the prevention and modification of occupational problems
- Visual screening: development of visual screening programmes; cost effectiveness of visual screening and its relation to incidence of disease; screening protocols and regimen; visual screeners
- Visual hazards and ocular protection in occupations and sports: nature and types of occupational/sports eye injuries and their prevention; types and uses of protective eyewear; radiation hazards in industry and their prevention
- Visual ergonomics and lighting: human visual capabilities and analysis of visual demands in visual tasks, visual requirements for different occupations; visual fatigue and its relation to visual task and visual demand; introduction to basic concepts in lighting design
- Visual display terminal (VDT): the visual display unit, its visual demands, its related eye problems, their causes and solutions

### *Professional Studies*

- Patient right issues and medical ethico-legal issues involving the optometry profession, and other healthcare professions
- Exploring, evaluating and developing one's own codes and standards for practice
- Analysis of medical ethico-legal issues, clinical decision-making and problem-solving
- Promoting and advancing the Optometry profession
- Introduction to the legal systems
- Biomedical ethics
- Medical negligence
- Consent
- Confidentiality and privacy issues
- Code of Practice
- Professional issues

### *New Technologies*

- Curriculum should include provisions for updating students on new technologies and future developments.
- Topics such as OCT, ultrasound biomicroscopy, electronic medical records.

*\* Elements are accompanied by practical and clinical session*

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